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CLAIMS

1. A method for analysing the functionalities of the heart and of the respiratory system of a patient, comprising:

    - segmenting cyclic heart beating sounds into physically defined classes and independently segmenting cyclic breathing cycle into physiologically defined classes;

    - associating segments of same class of said heart sounds with segments of same class of said breathing sounds, and

    - correlating physical characteristics of said heart sounds of same class with physical characteristics of said breathing sounds of same class.

2. A method for analyzing the functionality of the heart and the respiratory system as in claim 1, and wherein said cyclic heart beating sounds are synchronized by features of an EKG.

3. A method for analysing a change in the functionality of the heart and the respiratory system of a patient, comprising:

    - identifying the respiratory activity and cardiac sounds;

    - segmenting said respiratory and said cardiac sounds;

- classifying said segments of said respiratory and said cardiac sounds;

- extracting features of said classes;

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- comparing the features of said classes, and

- determining the significance of the deviation of a set of said features from a respective set of baseline

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   values .

4.   A method for synchronizing a heartbeat synchronized system , comprising:

- segmenting said respiratory activity

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   and said cardiac sounds, wherein data of cardiac sounds is obtained from at least one heart sound sensor;

- correlating physical characteristics of

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   said heart sounds of same class with physical characteristics of said breathing sounds of same class;

- determining the temporal signal structure of the heart, and

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   sending control signal to the heartbeat

   synchronized system.

5.   A method for synchronizing a heartbeat synchronized system as in claim 4, comprising:

- segmenting said cardiac sounds
  data obtained from a plurality of
  heart sound sensors respectively;

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- correlating physical characteristics of
  said heart sounds of same class
  using data of each sensor
  respectively with physical
  characteristics of said breathing
  sounds of same class r;

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- determining the temporal signal
  structure of the heart,

  sending control signal to the heartbeat

  synchronized system.

15 6. A diagnostic method for synchronizing a heartbeat synchronized
system as in claim 4.

7. A therapeutic method for synchronizing a heartbeat synchronized
system as in claim 4.

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8. A system for monitoring the interrelated functionality of the heart
and the respiratory system, comprising:

- at least one means for collecting heart
  beating sounds;

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- means for collecting cyclic sound of the
  respiratory system, and

- a means for processing said sounds.

9. A system for monitoring the interrelated functionality of the heart and the respiratory system as in claim 8 and wherein all sounds are collected by a plurality of means.

10. A system for monitoring the interrelated functionality of the heart and the respiratory system as in claim 8 and wherein said system is a part of a heartbeat synchronized device.

11. A system as in claim 10 wherein said heartbeat synchronized system is a monitoring device.

12. A system as in claim 10 wherein said heartbeat synchronized system is an intra-aortic balloon pump.

13. A system as in claim 10 wherein said heartbeat synchronized system is a left ventricular cardiac assist device.

14. A system as in claim 10 wherein said heartbeat synchronized system is a CT coronary angiography diagnostic device.

15. A system as in claim 10 wherein said heartbeat synchronized system is a SPECT diagnostic device.

16. A method for improving magnetic resonance angiography wherein said magnetic resonance angiography acquisition time is synchronized with the synchronized heartbeat.